DOCUMENT RESUME

ED 297 716 IR 013 420

AUTHOR Troester, Rod
TITLE The Introduction of New Technology from the User's Perspective: A Message-Q/ing Study.
PUB DATE May 88
NOTE 26p.; Paper presented to the Annual Meeting of the Eastern Communication Association (Baltimore, MD, April 27-May 1, 1988).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Communication (Thought Transfer); *Computer Literacy; Content Analysis; *Guides; Higher Education; *Information Needs; *Learning Processes; Models; Training; Undergraduate Students; Word Processing
IDENTIFIERS *Sense Making Approach

ABSTRACT

This study used the sense-making approach of message-q/ing to examine how individuals arrive at an understanding of new technology, in this case, word processing. Subjects were 10 computer naive undergraduate students learning to use word processing as part of a course requirement. Using the WordStar program manual, subjects employed the message-q/ing technique by noting the points in their reading where they would like to, or feel the need to, ask a question, and briefly explain how receiving an answer to their question would have helped their movement through the situation. It was assumed that examining these signal stops (questions or gaps) and the accompanying uses could provide insight into how individuals using such training materials were "making sense" out of, or constructing an understanding of the materials. It was found that 41% of the questions occurred at 12 places where two or more of the subjects identified signal stops of gaps, suggesting consistent patterns where individuals experienced gaps in their understanding of the training manual. At eight of the 12 places, it was found that the subject or topic requiring clarification was the same. It is suggested that this technique could be used by training manual designers to specifically identify and analyze users' questions and information uses in order to compare the sense-making patterns of actual users to those assumed by the designer of the manual. The text is supplemented by three explanatory footnotes and two tables. (21 references) (EW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED297716

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

THE INTRODUCTION OF NEW TECHNOLOGY FROM THE USER'S PERSPECTIVE:

A MESSAGE-O/ING STUDY

by

Rod Troester
Division of Humanities and Social Sciences
Penn State University at Erie, The Behrend College
Station Road
Erie, PA 16563
(814) 898-6442

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Rod Troester

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

A Paper Submitted to the Applied Communication Interest Group
Eastern Communication Association
May 1988

IR013420

THE INTRODUCTION OF NEW TECHNOLOGY FROM THE USER'S PERSPECTIVE:

A MESSAGE-O/ING STUDY

INTRODUCTION

The promise of technology is no longer a future possibility for the organization, the advance of technology is a fact of organizational life. Contemporary organizations can be characterized as having become increasingly information oriented and technologically sophisticated, in short, more complex.

The environment in which the organization exists has increased in complexity due primarily to the transition from an industrial manufacturing-based economy to an economy based on information and information management. In an extensive and detailed study of this transition, Porat (1977) concluded that information oriented organizations directly or indirectly generated 46% of the nation's Gross National Product. Naisbett (1984) characterizes this industrial-to-information transition as one of the "megatrends" currently shaping American organizational life.

With information as the prime strategic resource, commodity, and basis for organizational power (Porat, 1977; Naisbett, 1984; Goldhaber, Dennis, Richetto, and Wiio, 1979), information management technologies have become a more integral part of day-to-day organizational life than ever before. Conservative estimates suggest that by 1990, 40-50% of the workforce will be information management workers who will rely on upwards of 38 million computer terminals to assist in daily work routines (Butler, 1980; Guiliano, 1982). More liberal estimates place the number of information management workers at closer to 75% of the workforce (Naisbett, 1984). While the numbers vary and the estimates many be imprecise, the fact remains that information management technology is significantly influencing the

contemporary organization.

A challenge faces organizations and the individuals that comprise them as they function, change, and adapt in this complex, technological, information age. This challenge involves how organizations can effectively introduce and train employees to use available technologies in order to realize organizational goals and objectives.

Most approaches for introducing technological change into organizations advocated by writers and researchers focus on the notion of being user-centered. In discussing the notion of user-centeredness, Tapscott (1982) concludes that the main obstacle to office automation and the effective introduction of new technology is the lack of an adequate methodology for assessing user needs. In a survey conducted by Smith (1983a; 1983b), the concern for the user's perspective was found to be essential if a human perspective on the process of technological changes was to be maintained. Such a human perspective is essential, because as Conner (1985) points out, the rate of technological advancement often exceeds the capabilities of the individual to adapt and change. Conner concludes that if technological change is to be effective, the role of the trainer must change from that of the technical expert to that of the facilitator and coach.

In a survey of 19 major vendors of computer technology to organizations, Resnick and Fuerst (1985) provide one of the few examinations of the actual processes used in introducing new technology into organizations. One of the more important conclusions to be drawn from their survey is that as hardware and software systems become more standard among vendors, support services (i.e. training)

will rapidly become the deciding factor among competing vendors. While the vendors surveyed indicated that customer training was essential, only 50% of full-time field trainers' time was spent in direct training with the rest being spent in sales. A survey conducted by Hall-Sheehy (1985) suggested that client organizations themselves do very little in terms of computer training and development for their employees who use personal computers. This survey found that of the 21 companies surveyed (100 employees plus in a large metorpolitan area) it was found the 10 offered no training, 3 sent people for training outside the organization, 4 relied on disk-tutorials, and 4 had instruction in-house. These results are similar to those of a 1984 International Data Corporation study (referenced in Hall-Sheehy, 1985) which revealed the 61% of medium-sized U.S. companies offered no training for personal computer uses at any staff level.

Specifically in terms of the training methods used, of the 4 most preferred methods of instruction used by vendors, the classroom was rated first followed by instruction manuals, audio visual aids, and computer assisted disk-tutorials. In terms of the services rendered by vendors, reference and training manuals were found to be the industry standard. It seems that neither the vendor nor the organization take an active part in the introduction of new technology short of the actual decision to adopt the technology. Instead, there seems to be a strong reliance on training manuals, accompanying documentation, and disk tutorials.

Several studies have examined the effectiveness of the training manuals and written documentation, which seem to be the industry standard, and challenge the utility of such materials. Smith (1983a)

concludes that in order to ensure user-oriented systems, training manuals must be people oriented with a "Dick and Jane" style documentation designed to introduce users to the capabilities of the system (p. 93). A Rand Corporation study reported by Bikeson and Gutek (1983) found that while employees surveyed were relatively satisfied with the functionality, performance, and environment related to computer technology, the users manuals needed to interact with the system received the worst rating of any factor measured. Finn (1983) suggests that self-paced manuals with step-by-step instructions have some value but are often tedious, complicated, present material in an illogical sequence, and use inconsistent terms.

What appears to be happening within the contemporary organization is that the environment is becoming increasingly complex due to a shift from a manufacturing based economy to an information based economy which is, in turn, necessitating increasingly sophisticated information management technology. The organization's response to this complex environment has been the adoption of information management technology with the expectation that written forms of documentation will adequately introduce and train employees to use new technology. However, survey data suggest that such documentation may be largely ineffective in responding to the needs of the user. One of the keys as to why such written documentation is ineffective is found in the concept of user friendly or user oriented and how the needs of the user are determined.

Essentially, the designers or authors of computer training manuals and documentation are the ones who determine the information needs of the user. This one-way orientation to communication, the vendor and designer of training manuals serving as the 'sender'

formulating the 'message' conveyed through a written 'channel' to the employee acting as the 'receiver', is at the root of the problems experienced with training manuals and documentation. It is the intention of this study to explore the notion of user friendliness and user oriented from the user's perspective, in effect, to attempt to examine the introduction of new technology from a two-way communication orientation.

CONCEPTUAL ORIENTATION

The work of Brenda Dervin in the Sense-Making Approach to communication (1983) provides the conceptual foundation for the approach and methodology employed in the present study. The sense-making approach to communication differs from more traditional approaches to examining communicative behavior by explicitly shifting the focus of attention from the sender or source of messages to the receiver of messages. Traditional approaches to communication assume that information or messages were 'things' that senders conveyed to receivers via channels. From this perspective, if the sender worked hard enough in structuring his/her message and presented the receiver with the 'right' information, the receiver would be able to accurately assign meaning and significance to the message and 'get' the message the sender intended. Dervin contends that such an assumption simply does not correspond to what we know to be the truth (1976a, p. 325).

In contrast, Dervin (1983) offers a model of communication which includes the three variables represented in the following model:

Perceptions of --------Perceptions of--------Perceptions of
Situations Gaps w/in Situations Information Uses

The sense-making model and approach assumes that as individuals perceive situations in their movement through the environment

(perceptions of situations), they will inevitably encounter situations in which their movement is blocked or hindered in some way (perception of gaps within the situation), and use information to fill the gaps in their understanding of the situation and continue their movement through the situation. While the conceptual work and research that has been conducted using the sense-making approach is too extensive to be reviewed here (see Dervin, 1983), the notions of gaps and uses are of particular importance to the present study.

The notion of gaps in the sense-making model is drawn from the work of Carter, Ruggel, Jackson, and Heffner (1973). It is also from the work of Carter et al. that the model draws its emphasis on the individual moving through situations within the environment. Carter et al. illustrate the notion of gaps by the example of the student who raises his/her hand in the classroom as a means of stopping the signal/message being received in order to ask for clarification. As Carter et al. state:

> Stopping is a critical capability in constructing pictures whether one is trying to get someone else's picture of putting together his own picture of some situation prior to taking some line of behavior. (1973, p. 19)

In the above example the student's raised hand and question are an indication of a gap in his/her attempt to make sense and move through the situation and the information being presented. Further, the information contained in an answer by the instructor to the question would allow the student to use the information to fill the perceived gap in his/her understanding. Hopefully, an answer will help rather than hurt the student's attempt to move through and make sense of the information being presented.

It is within the framework of the sense-making approach and

specifically the notions of gaps and information uses, that the present study was conducted. Rather than examining on-going classroom interaction as in the example above, the same logic was employed in an attempt to examine the movement of the individual through the situation of being introduced to new technology via the standard training manual. Specifically, the present study addressed 2 research questions:

1. Are there consistent patterns to the sense-making activities (perceptions of gaps and uses) of individuals being introduced to word processing technology?

2. How do individuals' perceptions of information needs and uses (sense-making activities) compare to those dictated by the designers of word processing training manuals?

METHODOLOGY

An interview technique used in sense-making research called message-q/ing was used to examine how individuals arrive at an understanding of new technology, in the case of the present study word processing technology. The message-q/ing interview technique has unique characteristics suited to examining printed materials like training manuals and tutorials. Dervin (1983, p. 13) explains that the technique combines the sense-making approach to communication with the signal-stopping notion of Carter. The technique provides a means of examining the signal stops or gaps receivers' perceive as if there were a sender present to respond to their gaps or questions. The technique asks respondents to note points in their reading where they would like to, or feel the need to ask a question (their perceptions of gaps within the situation), and briefly explain how receiving an answer to their question would have helped their movement through the situation (their perceptions of information uses). The present study

assumed that examining these signal stops, (questions or gaps) and the accompanying uses could provide the designer of training and those engaged in introducing employees to new technology with useful insight into how individuals using such materials were 'making sense' out of, or constructing an understanding of the materials. Using this procedure, written materials can be assessed in terms of how they facilitate the sense-making activities of the reader.

Procedures

Participants for the study were 10 computer naive undergraduate Public Relations students at a large midwestern university. Learning to use word processing was a course requirement. Participants were instructed to complete the 2-step message-q/ing procedure outlined above on the WordStar Training Guide (MicroPro International Corporation, 1983). Each participant met individually with the researcher and were provided with initial assistance in starting up the computer and beginning the lessons. The procedures for using the message-q/ing technique or interview are outlined , Dervin (1983a, p. 54). In the present study, respondents were asked to:

1. Draw a slash (/) at each point in your reading where you experience the need to ask a question and write out your question as though there were someone present to answer it.

2. Briefly describe how receiving an answer to your question would have helped you in understanding the material.

Most of the participants completed the basic six lessons contained in the manual in 3-4 hours. After completing the lessons, participants provided the researcher with their copy of the manual indicating their gaps (the slashes) and their numbered questions and corresponding uses.

Methods of Analysis

Questions and uses were transcribed, coded, and content analyzed using the format suggested by Dervin, Harlock, Atwood, and Garzona (1980). This category scheme was somewhat modified for the present study. Gaps were analyzed using three content analytic templates focusing on the purpose, time, and movement orientation of the question or gap. Uses were analyzed using a 5-category scheme. Table 1 describes these templates and categories.

INSERT TABLE 1 HERE

Three trained graduate student coders content analyzed the data. All coding was done using a manual developed specifically for the study.[1] In coding the data, coders coded 85 questions in the SW Focus Template with 94% agreement (Scott's pi=.91), 85 questions in the Time Focus Template with 87% agreement (Scott's pi=.48),[2] and 85 questions in the Movement Focus Template with 78% agreement (Scott's pi=.65). The corresponding 85 information uses were coded with 72% agreement (Scott's pi=.62). Overall, coders coded 340 items with 83% agreement (Scott's pi=.77). The reliabilities reported here are within the acceptable range with the exception of the uses category[3].

Questions and uses identified using the message-q/ing technique were analyzed in order to address the research questions stated above. To assess if there were consistent patterns in sense-making behavior, the 85 questions and corresponding uses participants identified were recorded and summarized on a single copy of the written training manual. Questions and uses were recorded on this master copy in the same location as respondents identified on their copy using an identification number. Based on this tabulation and summary, it was possible to identify if respondents perceived gaps or questions at

similar or consistent points in their work with the manual. By analyzing the questions and uses identified by respondents and the patterns that emerge, it was possible to compare the actual sense-making behavior in which individuals engaged with those dictated by the designers and authors of the training manual.

RESULTS

The message-q/ing technique examined two of the three sense-making variables, respondents' perceptions of gaps and information uses. The 10 respondents described a total of 85 questions and corresponding uses in the course of their work with the WordStar manual, an average of 8 per person. A brief summary of how respondents' questions and uses were distributed within the categories outlined in TABLE 1 will be presented before addressing the specific research questions.

Within the 5W Template, "how" questions were the most frequent (38 or 45% followed by "what" questions (30 or 35%), "why" questions (12 or 14%), "where" questions (4 or 5%), and "when" questions (1 or 1%). The 85 questions were also coded within the Movement Focus Template. The most frequent type of questions within this template were "present" oriented questions (73 of 85 or 86%), followed by "future" (7 of 85 or 8%), and "past" (5 of 85 or 6%). Within the Movement Focus Template, two categories of questions asking about "where they are now" and "how to get from where they are to another place" were equally frequent with 36 or 42% each. These were followed by "how they got where they were" questions (9 of 85 or 11%), and "where they will be in the future" questions accounting for the remaining questions (4 of 85 or 5%).

Respondents described an information use for each question listed. Information uses designed to "get skills" were the most frequent (27 of 85 or 32%) followed respectively by "get control" uses (26 of 85 or 31%), "get started/or keep going" uses (15 of 85 or 18%), "get pictures" uses (14 of 85 or 16%), and "able to plan" uses (3 of 85 or 4%).

Research Question 1 Were there consistent patterns to the sense-making activities of individuals being introduced to word processing technology? In order to address this question, the 85 gaps identified were summarized on a single copy of the WordStar training manual. Each question was plotted on this summary copy in the same location indicated by the respondent.

In terms of consistent patterns, there were a total of 12 instances where two or more respondents identified signal stops or gaps at approximately the same location. (Some respondents located gaps in the margins while others located them in the actual text.) A total of 35 questions, or 41% of the total, occurred at these 12 signal stops. Nine of these gaps occurred at a point where 2 individuals indicated a question, at one stop 3 individuals indicated questions, and at another, 4 indicated questions. Finally, at one stop, 8 individuals indicated questions. These 12 signal stops or gaps, which accounted for 41% of the total number of questions asked, suggest that there were consistent patterns in where individuals experienced gaps in their understanding of the training manual.

In examining the actual sense-making activities, the questions and uses themselves, consistent patterns were also found. Of the 12 signal stops identified, 8 suggest considerable similarity in terms of

the topic of the question asked, and how those questions were coded within the sense-making categories. In several cases, the questions varied somewhat in phraseology, yet in 8 of the 12 instances, the questions referred to the same idea or procedure being discussed. One such instance will be detailed to illustrate.

At one signal stop instance, 8 of the 10 respondents identified one or more gaps or questions at the same location. These 8 respondents listed 11 questions at the point in the manual where they were required to type a short letter containing several mistakes that they would later correct. The 11 questions identified at this particular point dealt with 3 different topics and are summarized in Table 2. The first 2 questions on Table 2 deal with the topic of margins and how the letter should look within the margins. While similar in topic, these questions lack any measure of consistency in terms of how they were coded within the sense-making categories.

INSERT TABLE 2

Questions #3 and #4 are more consistent in terms of topic and question type, differing somewhat on uses expressed. Both questions request clarification of the process of capitalization and how that process is accomplished. Both are coded as "how" questions designed to learn about procedures and skills, both dealt with the respondents' present situation, and both were asked in order to learn "how to get from where the respondent was to another place." In terms of the gaps categories, the questions were consistent. The uses expressed differ somewhat with the use for question #3 being that an answer "would explain to me how to capitalize just one letter," (coded as get skill) and the use for question #4 being that an answer would "make this step

easier and not so awkward" (coded as get control). Other than this difference in how the uses were coded, there was considerable consistency between the sense-making behavior of these 2 respondents at this particular point.

Questions #5-#11 dealt with several different topics, yet all requested clarification of some specific skill or procedure the respondent felt was necessary in order for them to continue. All 9 of these questions (#3-11) were coded as "how" questions, all except for one (#6) were asked in order to learn something about what was presently happening to the respondent, and all were asked in order to learn "how to get from where the respondent was to another place." Within the gaps dimension of sense-making behavior, there was considerable consistency between these 9 questions even though the subject of the question varied somewhat.

In examining the uses expressed for these 9 questions (#3-11), there is again a measure of consistency. Four of these uses were coded as "get skill," 3 as 'get control," 1 as "get started," and 1 as "get pictures." The uses expressed as get skills asked for more specific instruction while those coded as get control expressed a need to end frustration and get out of a bad situation. This difference between uses was perhaps one of means, while sharing a common end, the mastery of the procedure.

In terms of the first research question, this example is significant for several reasons. First, this example is significant because 8 of 10 respondents experienced a gap at approximately the same place in their work. Further, this example is significant simply in terms of the number of questions that occurred, approximately 13%

of the total. Third, this example suggests and illustrates a degree of consistency to the sense-making behaviors in which individuals engage.

This example and the 9 other identified suggest that there are consistent patterns to the sense-making behavior in which individuals engaged while working with a written training manual in terms of the location of the gaps that were identified, the topic of the questions, as well as the sense-making categories that describe respondents' information needs and uses.

Research Question 2: How do the individual's perceptions of information need and uses compare to those dictated by the designers of word processing training manuals? One way to address this question would be to suggests that based on the results of this study, in at least 85 cases, there were differences in the sense-making behaviors dictated by the designers of the training manual and those of the user. This is perhaps an unfair means of assessing or comparing the sense-making behaviors designers assumed individuals would engage in, and those actually engaged in by users. Obviously, the designers and authors of such manuals cannot be expected to tailor the materials to accommodate each individual user.

A more equitable means of comparing assumed and actual sense-making behavior would be in terms of the consistent patterns of gaps and uses respondents experienced in working with the manual. In 12 instances, 2 or more respondents needed to stop the signal the designers of the manual provided at the same point in order to seek clarification of the material. At 8 of these 12 points, the subject or topic requiring clarification was the same. The presentation of the example above illustrates that perhaps something more than one

individual's misunderstanding was at work. In this case and those not detailed, the assumed information needs and uses dictated by designers were insufficient or inadequate for meeting the information needs and uses of the user. More important, perhaps, than comparing designer and user sense-making behavior is the potential that the message-q/ing technique holds for improving the quality of training manuals.

DISCUSSION AND CONCLUSIONS

This research project addressed an essential challenge confronting the contemporary organization, the challenge of how best to introduce and train organizational members in the technology that facilitates the management of information necessitated by increased environmental complexity. This research project and the literature reviewed suggest that the individual's experience with the technological change situation is an essential consideration to be made if the potentials of technology are to be realized. The research reported here was designed to examine the consequences for training personnel of examining the introduction of technology from an individualistic perspective. The message-q/ing technique was used to identify and describe the individual's perceptions of information needs and information uses while learning to operate new technology. The specific results of the individual's experience using this technique have already been summarized. What implications and conclusions can be drawn from these results?

The utility of examining the information needs and uses individuals experience while learning to use new technology is in how the results of such and analysis can be used by the designers of training materials. The literature presented suggested that written

training manuals are, at the same time, the most frequently used means of introducing new technology, and a significant source of frustration and confusion on the part of the user. The message-q/ing technique suggests a means by which designers, in the development of training materials, can examine and isolate the effectiveness of such materials from the user's perspective. The results of the study suggest a mean of specifically identifying and analyzing users' questions and information uses.

The utility of examining the information needs and uses the individual experiences while working with training manuals is demonstrated by the potential the technique suggests for examining and comparing the patterns of sense-making assumed by the designer with the actual patterns of sense-making of the user. Specific points in training manuals that tend to cause the user problems can be isolated and examined by using the technique. Designers using the technique in the development of training manuals would have a means of more accurately determining and responding to the information needs of the user.

While the results of this study are perhaps unique to the particular manual used, they demonstrate that the technique could be a useful tool in facilitating the learning of new technology. The technique allows for an essentially one-way communication situation to be examined as though it were a two-way communication situation. In doing so, perhaps the complexities of information management technology could more clearly be communicated to the user.

This potential for examining written training materials from a two-way orientation using the message-q/ing technique is important in two ways. First, the technique could be used in the initial

development of training materials as was already suggested. While it is true that the designer of training materials have considerably more technical expertise concerning the technology, such expertise is of little practical value if it is not communicated in such a way as to be understood by the user of the technology. The message-q/ing technique could be used in the developmental phase of the preparation of training materials to determine those areas where the technical expertise of the designer is not being effectively communicated to the intended user of the system. The technique, in this sense, becomes a feedback mechanism useful in clarifying and mediating between the technical expertise of the designer, and the information needs and uses of the user.

In addition to being useful in the design phase of training efforts, the technique suggest a useful means of monitoring the learning or sense-making activities of individuals as they are being trained on new technology. The technique provides a means for trainees to identify and express their information needs and uses, which in turn provides the trainer with a means of responding to perceived information needs and uses. The end result is again, a one-way communication situation being examined from a two-way communication perspective.

In terms of learning and change in organizations, the message-q/ing technique provides the means necessary to respond to and acknowledge the individual's perspective on the learning or change situation. In doing so, the technique has the potential for improving the quality and effectiveness of learning and change situations related to the introduction of information management technology within the organization.

FOOTNOTES

[1] This coding manual was compiled from the descriptions and suggestions provided in the research conducted using the sense-making approach to communication. See the reference list for these citations. The manual is available upon request.

[2] The extreme discrepency between the high percentage of agreement and the low Scott's pi is explained by the fact that 86% of all questions were coded in 1 of the 3 categories.

[3] Arriving at an acceptable level of inter-rater reliability, according to Holisti (1969) involves a balance or trade-off between the validity of the study and the reliability of the coding. The coding done in the current study was far from simple counts or categorizations. As the categories become more complex, reliabilities tend to decrease. Wimmer and Dominick (1983) suggest most published content analyses typically report reliability coefficients of about .90, or when using more conservative measures like Scott's pi, about .75. In the present study, lower reliabilities were accepted in order to allow the of the data to be explored.

REFERENCES

Bikeson, T. & Gutek, B. (1983). Advanced office systems: An empirical look at utilization and satisfaction. Santa Monica, CA: The Rand Corporation.

Butler, D. (1980). The office of the future. Management Today, November, 116-122.

Carter, R., Ruggel, W.L., Jackson, K., & Heffner, M.B. (1973). Application of the signal stopping technique to communication research. In P. Clark (Ed.), New models for mass communication research (15-44). Beverly Hills: Sage Publications.

Conner, D. (1985). Introducing new technology humanely. Training and Development Journal, 39, 33-36.

Dervin, B. (1976). Strategies for dealing with human information needs: Information or communication? Journal of Broadcasting, 20, 324-333.

Dervin, B. (1983, May). An overview of sense-making research: Concepts, methods, and results to date. Paper presented at the International Communication Association Convention, Dallas, TX.

Dervin, B., Harlock, S., Atwood, R., & Garzona, C. (1980). The human side of information: An exploration in a health communication context. In D. Nimmo (Ed.), Communication yearbook4 (pp. 591-608). Beverly Hills: Sage Publications.

Finn, N.B. (1983). The electronic office. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Goldhaber, G.M., Dennis, H.S., Richetto, G.M., and Wiio, O.A. (1979). Information strategies: New pathways to corporate power. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Guiliano, V. (1982). The mechanization of office work. Scientific American, 247, 66-75.

Hall-Sheehy, J. (1985). Let's forget computer literacy. Training and Development Journal, 39, 24-25.

Holisti, O.R. (1969). Content analysis for the social sciences and humanities. Reading, MA: Addison-Wesley Publishing Co.

MicroPro International Corporation. (1983). WordStar training guide. [Computer Program Manual]. San Rafael, CA: MicroPro International Corporation.

Naisbett, J. (1984). Megatrends. New York: Warner Books.

measurement. Office of Telecommunications, Special Publication #77-12(1). Washington, D.C.: U.S. Department of Commerce.

Resnick, H. & Fuerst, J. (1985). Everything you need to know about customer training by microcomputer vendors. Training and Development Journal, 39, 84-87.

Scott, W. (1955). Reliability of content analysis: The case of nominal scale coding. Public Opinion Quarterly, 19, 321-325.

Smith, H.T. (1983a). Managing tomorrow's workforce. Management World, 12, 9-10.

Smith, H.T. (1983b). The office revolution: Strategies for managing tomorrow's workforce. Willow Grove, PA: Administrative Management Society Foundation.

Tapscott, D. (1982). Office automation: A user-driven model. New York: Plenum Press.

Wimmer, R.D. & Dominick, J.R. (1983). Mass media research: An introduction. Belmont, CA: Wadsworth Publishing Co.

TABLE 1

DESCRIPTION OF SENSE-MAKING CATEGORIES AND TEMPLATES

Perceptions of Gaps

	CODE
The 5W Template: Assessing the question in terms of whether is asks about a gap involving:	
When: the timing of events.	7
Why: the reasons for and causes of events.	8
Where: the location of events.	9
How: the procedures or skills necessary for moving forward.	10
What: the nature of objects, events, and situations.	11
The Time Focus Template: Assessing the question in terms of whether it asks about a gap involving:	
Past: a point prior to the point at which the person is focusing.	12
Present: a point which is the current focus.	13
Future: a point that has not yet occurred.	14
The Movement Focus Template: Assessing the question in terms of whether it asks about a gap involving:	
Where they are now: a gap focusing on learning about the current situation.	15
How They Got Where They Are: gap focusing on movement from past to present.	16
How to Get From Where They Are to Another Place: a gap focusing on movement from present to future.	17
Where I Will be in the Future: a gap focusing on future situations.	18

Perceptions of Information Uses	Coded
Got Control of Bad Situation: This use looks at how answers can ease stress, make things easier, help move away from bad situations, and stop negative things from continuing. It is assumed the answers can get respondents out of a bad situation.	19
Got Pictures: This use involves getting or revising one's understanding of self, other, the relationship, situation, or object. It is assumed that in the absence of a clear picture, movement stops.	20
Able to Plan: This use assesses how an answer helped or hurt the ability to plan, make decisions, or prepare. It is assumed that movement requires direction and answer can provide such direction.	21
Got Started/ Kept Going: This use focuses on how an answer can help to encourage and motivate, or provide confidence and reassure. It is assumed that movement can be stalled because of barriers and answers can help overcome barriers.	22
Got Skills: This use assesses how answers can provide the applicable skills necessary for coping with a situation. It is assumed that movement requires certain skills not evident in the situation.	23

TABLE 2

SIGNAL STOP EXAMPLE

QUESTION	SW	TIME	MOVEMENT	USE
1. What happens if you mess up a word by making it appear out of margins?	11	14	18	19
2. How do I get the word back to its original location (within margins)?	10	13	17	23
3. How do you capitalize just one letter and not the whole word?	10	13	17	23
4. How does the capitalization key work?	10	13	17	19
5. How do I get rid of floating junk characters?	10	13	17	23
6. How do you move the cursor back if you forget to put a space in?	10	14	17	22
7. How do I correct an error?	10	13	17	19
8. How do I correct any mistakes I make in my typing?	10	13	17	23
9. How do I go back and correct the mistakes I have made?	10	13	17	20
10. How do I get my letter back after correcting a mistake?	10	13	17	23
11. How do I get rid of just one unwanted space?	10	13	17	19

Note: See Table 1 for an explanation of the above codes.